

## **NEEDLE-FREE JET INJECTION BIBLIOGRAPHY, DEVICE & MANUFACTURER ROSTER, and PATENT LIST**

**last update: 2002-November-01**

(Available at: <http://www.cdc.gov/nip/dev/jetinject.htm#bibliography>)

### **New or updated entries added since website-posted update of 2002-May-09:**

{Barclay1962}, {Béclard/Galante1866}, {Benenson1959b}, {Chobert19##}, {CDC2002}, ["Dentjector" device], {Ehrengut1977}, {Feinman1984}, {Galante1866}, {Galante1885}, {Gapochko1981}, {Grabowsky1992}, {Grabowsky1994}, {Gonzalez1997}, {Guérard/Mathieu1865}, {Hanson1979}, ["Hyjettor" device], {Jackson2001}, {Kernezys1997}, {Linder1979}, {Lloyd2000}, {Loktev1980}, {Lundholm2002}, {Millar1965}, {Mohammed1984}, Pilipenko1974}, {Sarno2000}, {Servajan1872}, {Servajan1876}, {Sherman1967}, {WHO1980}, {WHO1994}, {WHO/WPRO1995}, {WHO1997c},

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Bibliography initiation, 1994-1995 -- Ms. Lisa Lindsay, Emory Univ.  
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### **Legend:**

**~R:** Reprint copy requested.  
**Double-indented items:** Paper copy not yet received or not yet filed.  
**\* (asterisk):** Article on intradermal vaccination but NOT via needle-free injection device.

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[*Agafonov1969* compared 488 soldiers receiving traditional scarification with 1000 receiving smallpox vaccine with the BIP-4 jet injector. Vaccine “takes” were 98% in BIP-4 group and 93% in scarification group, with no complications observed.

Conclusions: BIP-4 vaccinates 1,500 persons per hour, 23 times faster than scarification method. Vaccination teams should include 1 MD or physician assistant and 2 persons to help clean injection site.]

{Agafonov1970} Agafonov VI, Vorob'ev AA, Nekrasov IL, Lukin EP, Nikonov VA. Tekhnika provedeniia vaktsinatsii bezygol'nym in "ektorom BIP-4" [Technic of carrying out vaccinations with the needless injector BIP-4]. Voenno-meditsinskii Zhurnal [Military Medical Journal] (Russia) Jul 1970;7:51-52.

[*Agafonov1970* describe Pneumatic Jet Injector (B I P) BIP-4 device (includes photograph), weighing 1,500 g, using air or nitrogen power, consuming 10 liters per 1000 injections. Accepts 10-100 mL vials. Can be used for ID, SC, or IM injections. 10% of the time a blood droplet appears after injection.]

{Agafonov1972} Agafonov VI, Babkin EI, Vdovin DG, Vorobeichikov VM, Vorobiev AA, Gamieshko KP, Gapochko KG, Gefen NE, Evstigneev VI, Emelyanova OV, Zemskov EM, Imamaliev OG, Kamalov II, Kvirkadze VV, Kutyrev PA, Misnikov OP, Pushkarev VP, Rozhdestvensky DA. Sravnitel'naya kharakteristika proizvoditel'nosti razlichnykh metodov immunizatsii protiv chumy [Comparative characteristics of productiveness of various methods of plague immunization]. Zh Mikrobiol Epidemiol Immunobiol (Russia) Nov 1972;49(11):106-112.

[*Agafonov1972* compared oral, “aerogenic”, and jet injection (BIP-4) routes of plague vaccine immunization, which each proved to be 10 to 15 times more productive in comparison with subcutaneous and “skin” methods.]

{Agafonov1973} Agafonov VI, Beliakov VD, Ishkil'din MI, Khokhlov DT, Rabinovich IaD. Immunologicheskaiia effektivnost' privivok protiv ospy i tularemii bezygol'nym metodom [Immunological effectiveness of immunization against smallpox and tularemia by the jet injection method]. Voenno-meditsinskii Zhurnal [Military Medical Journal] (Russia) Apr 1973;4:48-51

[*Agafonov1973* compared immunogenicity and safety of both needle-free and conventional vaccination routes (needle injection or scarification, respectively) for tularemia and smallpox vaccines. They found comparable safety and immune responses, with titers somewhat higher for jet injection than the conventional route for both vaccines.]

{Agafonov1974} Agafonov VI, Babkin EI, Bulatova TI, Gamleshko GP, Gapochko KG. Bezygol'nyi metod immunizatsii assotsirovannymi sorbirovannymi vaktsinami [Jet method of immunizing with associated adsorbed vaccines]. Voenno-meditsinskii Zhurnal [Military Medical Journal] (Russia) Dec 1974;(12):44-48.

[Agafonov1974] compared needle and syringe with BI-2 and BI-3 jet injectors in guinea pigs and human cadavers. Guinea pigs showed less tissue damage than with old BIP-4 model. The BI-2 device delivered 1.0 mL doses of typhoid polyanatoxin vaccine (TAB<sub>te</sub>), botulism toxoid, and/or tetanus toxoid to 1,581 soldiers, while the BI-3 was used for 1001 soldiers. Efficacy was comparable. Reactogenicity was "bearable".

{Agafonov1977} Agafonov VI, Vorobiev AA, Gapochko KG, Marenikova SS, Patrikeev GT, Babkin EI, Litvinova AP, Shenkman LS, Dorokhina TV, Podkuiko VN, Slobodin AZ, Shernoschekov KA, Borodai AP, Emelyanova OV. Sravnitel'naya otsenka sredstv i metodov immunizatsii liudei protiv natural'noi ospy [Comparative assessment of the means and methods of immunizing humans against smallpox]. Zh Mikrobiol Epidemiol Immunobiol (Russia) Jun 1977;(6):31-35. [oral, ID, jet injection]

{Agafonov1978} Agafonov VI, Bulatova TI, Gamleshko KhP, Gapochko KG, Gorodetskii RD. Effektivnost' kompleksnoi immunizatsii briushnotifoznoi vaktsinoi s poliana-toksinom v sochetanii s chumnym i ospennym antigenam [Effectiveness of comprehensive immunization with typhoid fever vaccine and polyanatoxin in combination with plague and small pox antigens]. Voenno-meditsinskii Zhurnal [Military Medical Journal] (Russia) Oct 1978;(10):51-4

[Agafonov1978] studied immunogenicity of simultaneous administration of typhoid polianatoxin vaccine via needle-free jet injection, plus oral smallpox, and oral plague vaccines. Immunogenicity was comparable to similar vaccines given by themselves. The frequency of systemic reactions to the typhoid vaccine by needle-free injection was 6.9%, while local reactions were 82% - 93%.]

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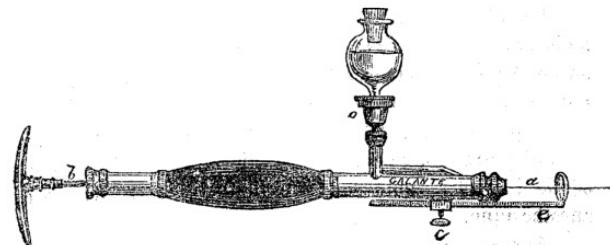
X. M. BÉCLARD présente à l'Académie, de la part de M. Galante, un petit instrument pour pratiquer l'hydro-puncture.

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Un jet capillaire de liquide, lorsqu'il est projeté sur un point de la peau et avec la force de vingt-cinq atmosphères au moins, la perce, et le liquide est introduit dans les mailles des tissus organisés.

Il s'agissait de faire un petit instrument qui produisait ce jet et cette force; c'est ce qu'a fait M. le docteur Sales-Girons avec une seringue fabriquée par M. Galante.



Le liquide est contenu dans une petite ampoule de verre; en tirant le piston il entre dans le corps de la pompe, dont le diamètre n'excède pas 3 millimètres de calibre; en poussant avec le simple effet de la main, il sort un fillet capillaire avec la pression voulue de 25 à 30 atmosphères.

Appliqué sur le point désigné de la peau, l'opération de l'hydro-puncture se pratique avec la plus grande facilité. Ce procédé est mis à profit aujourd'hui contre les névralgies rebelles, avec de l'eau pure ou des liquides médicamenteux.

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**APPAREIL POUR L'AQUA-PUNCTURE  
(de M. le docteur Sales-Girons)**

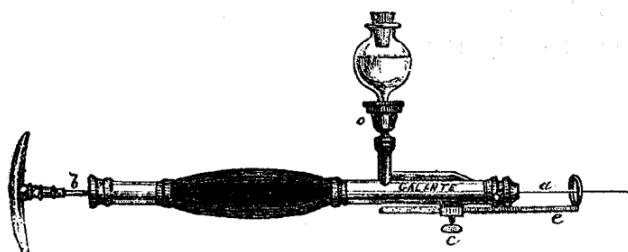


Figure 33.

Cet appareil se compose : 1<sup>o</sup> d'un corps de pompe dont le diamètre intérieur n'excède pas 0<sup>m</sup> 003, ce qui permet à l'opérateur de produire sur le liquide, à l'aide du piston, une pression considérable, relativement à la force qu'il emploie ; 2<sup>o</sup> d'un récipient en verre ayant à peu près la forme d'un entonnoir, maintenu sur le corps de l'appareil au moyen d'une pièce métallique *a*, percée d'autre en outre, et par laquelle il communique avec ce dernier.

L'une des extrémités de l'instrument se trouve terminée par une petite plaque en platine, percée au milieu d'un trou capillaire, la même extrémité supporte également une tige *e* surmontée d'un anneau, laquelle sert de point d'appui et de guide à l'appareil lorsqu'il fonctionne.

Pour cela faire, après avoir placé le liquide, qui doit servir à l'opération, dans l'entonnoir en verre, on aspire ledit liquide en attirant à soi le piston, de manière à ce que le corps de pompe en soit rempli; on applique ensuite le guide *e* sur la partie destinée à être injectée ; il suffit alors de pousser en avant la tige *b*, tout en maintenant, de

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la main gauche, le corps de l'appareil, pour obtenir un jet filiforme d'une telle force qu'il pénètre facilement dans les tissus.

De tous les appareils connus pour ce genre d'opérations, celui-ci, que nous avons construit d'après l'idée de M. le docteur Sales-Girons, est le seul aussi peu volumineux et aussi portatif.

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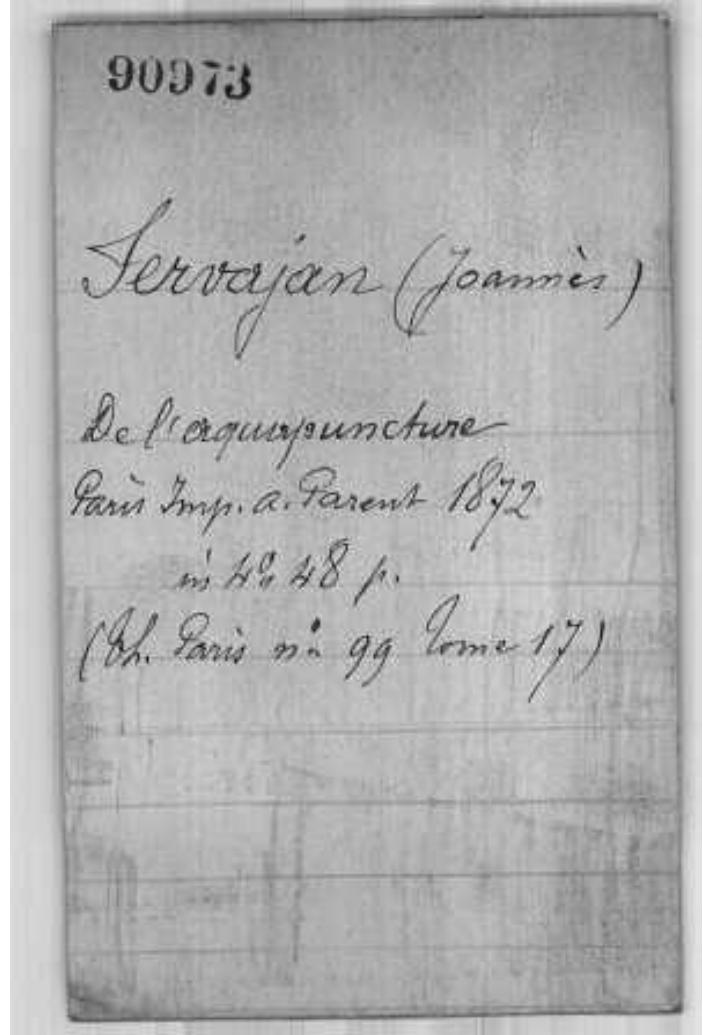
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Dr A. Krantz. Bulletin de la société medicale de Pau. Effets spectaculaires de la "Jet-Puncture" dans les douleurs fonctionnelles [NOT IN MEDLINE]

E.G Lapinet. International conseils Cosmeto-Biodynamiques. Injecter un liquide dans les rides du visage avec le Dermo-Jet [NOT IN MEDLINE]

Malaplate M. [TITLE??? - about BCG and Dermo-Jet, France] [SOURCE???] [NOT IN MEDLINE]

R. Martin du Pan. Le Dermo-Jet peut-t'il rendre des services en Médecine Militaire? Journal trimestriel des Officiers Suisses du service de Santé [NOT IN MEDLINE]

R. Martin du Pan. La vaccination contre la variole par le Dermo-Jet. IVème congrés International pour les maladies infectieuses. **YEAR??? CITY???**  
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Ch. Merieux, J. Liautaud, R. Plan, R. Triaud. VIème congrés national de transfusion sanguine, Préparation d'une gammaglobuline humaine spécifique du téтанos [NOT IN MEDLINE]

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Dr Schweiz. Serum & Impf institut Bern. Vaccination BCG [NOT IN MEDLINE]

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G.N. Wachs & T. A. Tromovitch. Cutis/Original Article. Treatment of Alopecia Areata with the Dermo-Jet [NOT IN MEDLINE]

M. Wolinger. Compte rendu (**de ????**). Notre experience avec le Dermo-Jet du Dr Krantz [NOT IN MEDLINE]

Xguyen Dinh Huong. Tiem Phong Lao Bang PhuOng Phap Dermo Jet. **TITLE???**  
**YEAR??? VOL??? PAGES???** [NOT IN MEDLINE]

#### **RELATED-SUBJECT ARTICLES NOT SPECIFICALLY “NEEDLE-FREE”**

Chippaux JP, Soula G, Campagne G, Rey M, et al. Optimiser la riposte aux épidémies de méningite à méningocoque: rapport d'un atelier d'experts réunis au CERMES (12 au 14 janvier 1998, Niamey, Niger). Atelier de Niamey [Optimizing the response to epidemics of meningococcal meningitis: report of a workshop of experts at CERMES (Niamey, Niger, 12th to 14th January 1998)]. Cahiers Santé May-Jun 1998;8(3):245-248.

#### **MANUFACTURER ROSTER (past & current, listed by device tradename)**

**Accell®** (see **Helios™**)

**Advantajet™, Freedom Jet™, GentleJet™**, (also see **PreciJet™, Preci-Jet 50®**)  
see Bareille1997

<http://www.advantajet.com/index.html>

Activa Brand Products, 6845 Davand Drive, Mississauga, Ontario Canada L5T 1L4

Tel: 902-566-3229, Fax Numbers - 902-629-1404 or 905-565-0065

[Formerly: Health-Mor Personal Care Corp. 185 East North Street, Bradley, Illinois

**JET INJECTION Bibliography**

Bruce G. Weniger file: Jetinject-Bib.doc &amp; .pdf

**p. 53 of 66**

last update: 2002-Nov-01

60915, 815-932-5570, fax 815-932-4101, bought out 1998 by Canadian  
company.]

**Am-O-Jet™**

American Jet Injector, Inc., 880 Orchard Lane, Lansdale, PA 19446-4520,  
Tel: (215) 362-4815, Fax: (215) 362-4819, pager: 800-609-7231  
Orifice: .005 inch = 0.127mm  
Same out-of-patent design as Ped-O-Jet®

**Avijet (see Syrijet Mark IV)**

See Eidson1976  
Mizzy, Inc., New York, NY

**Berijet**

Behring, Frankfurt Germany  
see Zachoval1988

**BI-100™, BI-3M™, BI-1MT™, BI-2, BI-3, BIP-4, BI-19**

see Agafonov-multiple years, Vorob'ev1972 (photos), Evstigneev1994, Lukin1997,  
Chemical Automatics Design Bureau (KB Khimavomatiki), Voronezh, Russia  
Scientific & Research Institute of Surgical Instruments and Equipment (engineers L.F.

Banacov and S.P. Vanjushin)

<http://www.inspacemedia.com/english/info/industrylinks/2001/006.shtml>  
<http://www.istc.ru/istc/db/inst.nsf/wu/1141>  
<http://www.russianspace.com/voronezh.html>  
<http://www.fas.org/spp/civil/russia/kbkha.htm>  
[http://www.path.org/technos/ht\\_measles\\_elim\\_inject.htm](http://www.path.org/technos/ht_measles_elim_inject.htm)  
<http://www.path.org/files/htup-JetInjector.pdf>  
<http://www.feltonint.com/>  
<http://cisal.lanl.gov/Forms/Alan.pdf>

**Biojector™ 2000**

See Monroe1992, Jackson1993, Davis1994, Gerbert1996, Williams1996, Gardner1997,  
Greenberg1995, Zsigmond1995, Zsigmond1996, Gerbert1996, Florentine1997,  
Anonymous1997, Bennett1998, Phero1998, Boyer??YEAR??, Stone??YEAR??,  
Schultz??YEAR??,

<http://www.bioject.com/>

Bioject Inc., 7620 SW Bridgeport Road, Portland, OR 97224)

<u>BIOJECTOR ORIFICES:</u>	<u>inches</u>	<u>mm</u>	<u>Indication</u>
cartridge #2 (green 1502100) =	0.0039 inch	0.10 mm	SC
cartridge #3 (brown 1503100) =	0.0059 inch	0.15 mm	IM thigh - infants 15-20", 0-15 lbs.;
			IM deltoid - 21-47"/16-50 lbs
cartridge #4 (blue 1504100) =	0.0078 inch	0.20 mm	IM thigh/gluteus 21-47"/16-75 lbs.
			IM deltoid children >50 lbs, small

cartridge #5 (silver 1505100) =	0.0098 inch	0.25 mm	adults (<80% median lean weight for height)
cartridge #7 (red 1507100) =	0.0142 inch	0.36 mm	IM deltoid average
			adults (80-120% median lean weight for height)
			IM deltoid large adults (>120% median lean weight for height)

**Biostar**

Biostar, Inc., 343-111 Research Drive, Saskatoon, Saskatchewan S7N 3R2, Canada,  
Tel: [1](306) 931-7500, Fax: [1](306) 242-9010,  
email: jmanns@innovplace.saskatoon.sk.ca

**DCI, Inc.**

see LectraJet™

**Dentjector®**

Robbins Instruments Company, Chatham, NJ 07928  
See advertisement and photograph on page 97 after Greenfield1972 article.

**Derata Medi-Jector V**

see Medi-Jector (below)

Depuy, Inc., 700 Orthopaedic Drive, Warsaw, IN 46581-0988,  
Fax: 219-267-7196, Sales: 219-267-8143, 800-366-8143

**Dermo-Jet™ [Dermojet], VACCI-JET (various models)**

see Krantz1959, Juel-Jensen1965, Calvert1966, Lane1966, Cooper1966, Jeanneret1967,  
Krantz1970, tenDam1970, Griffiths1971, Bakhur1972, Steinbrocker1973,  
Bonner1973, Lachapelle1977, FernándezdeCorres1982, Lachapelle1982a,  
Lachapelle1982b, Kok1983, Lachapelle1985, Dimache1986, Mihailescu1989,  
Dimache1991a, Dimache1991b, Brodell1995, Furth1995, Dimache1997

Société AKRA, 23 bis rue Louis Barthou, Pau, FRANCE 64000, Tel: [+33] 59 274746,  
Fax: [+33] 59 272270, <http://www.chez.com/dermojet/>,  
[dermojet@club\\_internet.fr](mailto:dermojet@club_internet.fr)

Previous U.S. distributor: Louis A. Awamy, 113 Sheraden Avenue, Staten Island, New York 10314.

(Orifice = 0.2mm = 200um)

**Dermojet S-591-H**

no. 106078 B1 OSIM Romania

Manufactured by Aerotech S.A., Hydraulic and Pneumatic Equipments, Bucharest,  
Romania (see Dimache1997).

Ormont Drug and Chemical (see Shen1981)

**Felton Medical, Inc. and Felton Medical International (See BI-100™, et al.)**

11535 West 83rd Terrace, Lenexa, Kansas (KS) 66214

Tel: [+1] (913) 599-5959, Fax: [+1] (913) 599-0909, felton@wws.com  
<http://www.feltonint.com/>  
<http://www.feltonmedical.com/>

**Genesis Medical Systems, Inc. (See Sensa-Jet)****Helios™ "gene gun"**

(related **Accell®** [Agracetus, Madison WI] and **Biostatic® PDS 1000/He** bombardment systems)  
see Williams1991, Fynan1993, Pertmer1995, Haynes1996, Feltquate1997,  
Bio-Rad, Inc., [http://www.bio\\_rad.com](http://www.bio_rad.com), Life Science Research Group, 2000 Alfred  
Nobel Drive, Hercules, CA 94547, Tel: (510) 741-1000, toll free 1-(800) 424  
6723, Fax: (510) 741-5800, toll free fax: 1-(800) 879 2289, telex: 335-358.

**Hypospray®**

see Figge1948, Hingson1947, Hughes1949a (photo), Perkin1950 (photo), Ziff1956,  
Cockburn1965, Cunningham1965, Garbsch1966, Baum1967, Morse1967,  
Spiess1968, Wright1968, Hughes1969a (photo), Hughes1969b (photo),  
Helm1969, Neumann1973, Werner1974, Vadhera1975, Clarke1975  
R.P Scherer Corp, Detroit, MI circa 1940s-1950s  
"Metapule" orifice = 0.003 - 0.005 inch = 0.076 - 0.127 mm (75-80um = 0.003)

**Hyjettor**

see WHO1980.  
Tokyo Sokuhan Co., Ltd. (now Nidec Tosok Corporation), Japan  
[http://www.tosok.co.jp/gaiyo/e\\_gaiyo.html](http://www.tosok.co.jp/gaiyo/e_gaiyo.html)

**Iject™ (see Biojector 2000)****Imo-Jet™, I.M.-O-JET™ (Also see Mini-Imojet®)**

multiple-use-nozzle device  
Institut Mérieux, Lyon, France;  
see Greenwood1980, Whittle1987, Rey1989, Galy1992

**Inject-100**

Inject Medical Products, Inc., 22500 Muirlands Boulevard, Lake Forest, CA 92630

**INJEX™**

Equidyne Systems, Inc., 11696 Sorrento Valley Rd., Suite J, San Diego, CA 92121,  
Phone 619-350-8096, Fax: 619-350-9726, equidyne@equidyne.com,  
<http://www.equidyne.com/>

**Inraject™**

Weston Medical, Ltd. New Street, Stradbroke, Eye, Suffolk, England 1P21 5JG, UK,  
Tel: [+44] (1379) 383-900, Fax: [+44] (1379) 384-800  
<http://www.weston-medical.com>

**Isajet™ (see Mesoflash®)****Ject-Aid [?? NOT YET CONFIRMED AS “NEEDLE-FREE” ??]**

Past addresses: Autoject Systems, Inc., Oakwood Centre, 620 Wheat Lane,  
Oakdale, IL 60191 USA ???  
Injectec, Inc., 11278 Los Alamitos Blvd, Suite 202, Los Alamitos, CA 90720 USA ???

**J-Tip®, J-Tip® Injector System**

US Patent no. 4,913,699

National Medical Products (Tim Chapman), 57 Parker Street, Irvine, CA 92618

Tel: [+1] (949) 768-1147, Fax: [+1] (949) 768-1167, info@jtip.com

<http://www.jtip.com>

(Formerly: California Medical Innovations, Inc., 24121 Big Timber Street, Lake Forest,  
CA 92630)

0.5 mL device: orifice size 0.008 inch (0.2 mm)

0.25 mL device: orifice size 0.006 inch (0.15 mm)

**LectraJet™ (tentative, *inter alia*)**

D'Antonio Consultants International (DCI), Inc.

6308 Fly Road, E. Syracuse, NY 13057

Tel:(315)463-4999 Fax: (315)463-5267 Email: rdcil@twcny.rr.com

<http://www.dantonioconsultants.com>

US patents 5080648, 5318522, and US5569190

**MadaJet™, MadaJet XL™**

see Field1985, Lamm1985

MADA Medical Products, Inc.

[http://www.madainternational.com/us/menu\\_us.html](http://www.madainternational.com/us/menu_us.html)

US:

MADA Equipment Co., Inc.

60 Commerce Road, Carlstadt, NJ 07072, USA

Tel: 1-201-460-0454, Fax: 1-201-460-3509, Toll Free: 1-800-526-6370

110522.1404@compuserve.com

International:

MADA International, Ltd.

11430 N. Kendall Drive Suite 312, Miami, FL 33176, USA

Tel: 1-305-274-2184, Fax: 1-305-274-2692, info@madiinternational.com

**Med-Jet™**

Medical International Technologies, Montréal, Canada

**Med-E-Jet™ (Pow'r-Ject™ - veterinary application)**

see Neufeld1977, Cooke1980, Seddon1981, McKenzie1978, Cohn1972, Cohn1974,  
Canter1990, Vahsing1994.

Latest: “Med-E-Jet Inoculator”, Evans Enterprise, 1293 Sunset Road, Mayfield Heights,  
Ohio 44124 USA, tel: (440) 473-1110, fax: (440) 473-1150, Evans@star21.com,

[http://www.clevenet.com/med\\_e\\_jet/](http://www.clevenet.com/med_e_jet/)

Earlier owner: Med-E-Jet Corporation, 12900 Trisket Road, Cleveland, Ohio 44115  
Earlier owner: 8092 Olmway Avenue, Olmsted Falls, Ohio 44138, Tel: 1-800-231-4203.  
(DSCP/DOD 28-May-98: "...Mr. Don Kuch now owns the parts and plans for  
their unit.")  
orifice size: 0.15mm (Seddon1981)

**MEDiVAX™**

Program for Appropriate Technology in Health (Vitajet Corp.)  
4 Nickerson Street, Seattle, Washington  
orifice = 0.006 inch  
<http://www.path.org>

**Medi-Jector EZ®, Medi-Jector Choice®**

See Neufeld1977, Martins1979, Houtzagers1988, Denne1992, Partsch1997,  
Gonzalez1997

Antares Pharma (<http://www.antarespharma.com/>)  
[Formerly: Medi-Ject Corporation <http://www.mediject.com/>]  
[Formerly: Daystrol-Scientific, Inc. Minneapolis, MN 55435]  
[Formerly: Derata Corporation (see Pehling)]  
Former address: 161 Cheshire Lane, Suite 100, Minneapolis, MN 55441 USA (800) 328-  
3074 or (612) 475-7700. Fax: (612) 476-1009  
Latest address: 161 Cheshire Lane, Suite 100, Minneapolis MN 55441 USA, tel 612-475-  
7705, fax 612-476-1009

**Mesoflash®, Isajet™**

see Lachapelle1985, Haensler1999.  
rue Gustave Gresse, 26400 Aouste sur Sye, France  
Tél (04) 75 76 60 53, Fax (04) 75 76 60 54, pprolitec@compuserve.com  
(Mesoflash® models M10 and M40, Isajet™ models Isa10 [mice], Isa40 [humans])  
Formerly: Béarn Mécanique Aviation S.A. (Boite Postale 41, Lons, F-64143 Billère,  
Cedex France)

**Mini-Imojet® (using Imule® cartridge) (also see Imo-Jet)**

see Whittle1987, Rey1989, Galy1992, Fisch1996, Parent du Châtelet1997  
Pasteur-Mérieux Sérum et Vaccins (Pasteur Merieux Connaught, Rhône Poulenc, later  
Aventis Pasteur): Dr. Jean Lang: lang@bdr.pasteur-merieux.fr, 58 avenue  
Leclerc - B.P. 7046, 69348 LYON Cedex 07 FRANCE, Tel: (33) 7273 7036,  
Fax: (33) 72 73 78 13

**Pan-Jet, PanJet, Panjet-70, Panjet Mark 5 ("Intrajet")**

see British Thoracic and Tuberculosis Association 1971, Stanfield1972, Paul1978,  
Lambrianidis1979, Sowray1981, Berry1981, Whittle1987  
SHUCO International, Ltd., London, UK  
Former U.S. distributor: Panray Division, Ormont Drug and Chemical Co., South Dean  
Street, Englewood, New Jersey 07631.

**Ped-O-Jet®**

see Gateff1960s/1970s, Meyer1964, Meyer1965, Hendrickse1966a, Hendrickse1966b, Artus1966, Bettag1967, Morse1967, Gateff1968, Dull1968, Millar1969a, Millar1969b, Neff1969, Chambon1970, Gateff1970, Labusquiere1971, Millar1971, Gotschlich1972a, Gotschlich1972b, Carnus1973, Rey1973, Rubin1973, Carnus1974, Neufeld1977, Mohammed1981, Pluciennik1985, Fenner1988, Furth1992, Furth1995, Jenkins1995, *inter alia*

U.S. patent no. 3,301,190

Manufacturer/distributed by Ped-O-Jet International - Keystone Industries, 616 Hollywood Avenue, Cherry Hill, NJ 08002, Tel: 609-663-4700, Fax: 609-663-0381, [nkeystone@aol.com](mailto:nkeystone@aol.com)

Previous manufacturers:

- (1) Stirn Industries, Dayton NJ (US production, French ownership)
- (2) Vernitron Medical Products, Inc., Carlstadt, NJ;
- (3) Scientific Equipment Manufacturing Corporation (SEMCO), Lodi, New Jersey; and also Larchmont, New York (previous name "Hypodermic jet injection apparatus, automatic")

Subcutaneous nozzle orifice diameter: .005 inch = 0.127mm

Intradermal nozzle orifice diameter: ???

**PenJet™**

(US patents 5,730,723 & 5,851,198)

Visionary Medical Products Corporation; Penjet™

Box 6911, Beverly Hills, CA 90212, Tel: 310-201-0800, [info@vmpc.com](mailto:info@vmpc.com)

<http://www.vmpc.com/>

**Porton Jet, Port-O-Jet**

see White1969, Vibes1971.

**Powderject™**

See Dégano1998, Duckworth1998,

PowderJect Vaccines, Inc.

585 Science Drive, Madison WI 53711

Tel 608-231-3150, Fax 608-231-6990, <http://www.powderject.com/>

russ\_smestad@powderject.com, lendon\_payne@powderject.com

(Formerly: Geniva/Oxford Bio Sciences Ltd.)

(?Corporate links with BIO-RAD/Auragen DNA gold beads jet guns: **Helios™**, **Biolistic® PDS 1000**, and **Accell®**)

**Pow'r-Ject™ (see Med-E-Jet™)****Preci-Jet 50®**

Identical to AdvantaJet® etc. (see above)

see Theintz1990, Bareille1997, Denne1992

Advanced Medical Technologies, Charlottetown, Prince Edward Island, C1E 1B0 Canada

**Press-O-Jet**

See Warren1955, Hingson1957 [diagram], Hingson1963  
developed by Ziherl, Kish, and Warren (Z. & W. Manufacturing Co.)  
orifice = 0.003 - 0.005 inch = 0.076 - 0.127 mm  
1 mL steel reusable chamber  
Distributor: Robbins Instruments, Inc., 2 North Passaic Ave. - Box 441, Chatham, NJ  
07928, Tel: (201)635-8972, Fax: (201)635-8732

**Sensa-Jet™**

Genesis Medical Technologies, Inc.  
Robert E. Jones, President/Director, Suite 400B, 1600 Downing Street, Denver, CO  
80218, Tel: 303-832-4909, Fax: 303-832-4919, cell 303-472-2997,  
genmed@idt.net  
Press release: <http://www.prnewswire.com/cgi-bin/stories.pl?ACCT=104&STORY=/www/story/12-22-1998/0000831767&EDATE=>

**SICIM**

SICIM s.p.a., Via Aquileia, 94, 34076 Romans d'Isonzo (GO) Italy,  
Tel: 39 481 90188/ 39-481 90332, Fax: 39 481 90332)

**SNAP JET®**

Cambridge Biostability, Ltd.. Sumpter House, 8 Station Road, Histon, Cambridge CB4  
4LQ United Kingdom  
Fax: [+44] (1223) 352-960

**Syrijet, Syrijet Mark IV (see Avijet)**

See Bennett1971, Bennett1972, Greenfield1973, Mott1973, Mott1974, Frymire1974,  
ElGeneidy1974, Hardison1977, Danowski1978, Denne1992, Ellis1992,  
Grau1997, Lundholm2002,  
Mizzy, Inc. - Keystone Industries, Cherry Hill, NJ, 616 Hollywood Avenue, Cherry Hill,  
NJ 08002, Tel: 609-663-4700, Fax: 609-663-0381, nkeystone@aol.com  
(Formerly, Mizzy, Inc., New York, New York, and Clifton Forge, Virginia, USA)

**Tender Touch**

Derata Corporation, Derata, MN  
see Jovanovic-Peterson1993)  
see Medi-Jector, above

**Twinjector EZ** (Japan Chemical Research, see Suzuki1995)**VACCI-JET (see Dermo-Jet)**

See Krantz1970.

**Velo-dermic jet**

See Hingson1957 for mention

**Vitajet®**

<http://www.vitajet.com/>

Vitajet Corporation,  
27071 Cabot Road, Suite 110, Laguna Hills, CA 92653,  
714-582-0713, 800-848-2538)

Vitajet Industria e Comercio  
Rio de Janeiro, Brazil

1998-99: became subsidiary of Bioject, Inc. See **Biojector® 2000**  
See: Rayman1989, Jackson2001

## **Z&W Manufacturing Company**

see **Press-O-Jet**

Warren1955, Hingson1957, Hingson1963  
**Z&W** Manufacturing Company, 1951-1958,  
multidose JI  
electric powered spring compression, hand-pump syringe compression,

## **PATENTS (listed by number)**

### U.S.A. Patents (Washington, DC: United States Patent Office)

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**GENERAL / MISCELLANEOUS RESOURCES - JET INJECTION**

**The Brother's Brother Foundation**

(Founded by Robert Hingson, father of jet injection)  
1501 Reedsdale Street, Suite 3005  
Pittsburgh, PA 15233-2341  
Phone: (412)321-3160, Fax: (412) 321-3325, BBFound@aol.com  
<http://www.brothersbrother.com/>

**CDC webpage on needle-free jet injection technology**

<http://www.cdc.gov/nip/dev/jetinject.htm>

**Needle-free Injection Technology News Service**

<http://vaxdev.forum.cdc.gov>

**Origins of jet injection experience in USA**

Arnold Sutermeister, mechanical engineer noticed injections of diesel oil into workmen hands via pinholes in high-pressure oil lines. Teamed with surgeon John F. Roberts in prototype jet injector in 1933. See Pollack1971.

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